

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
17 February 2005 (17.02.2005)

PCT

(10) International Publication Number  
**WO 2005/014619 A3**

(51) International Patent Classification<sup>7</sup>: **A61K 38/00**

(21) International Application Number:  
PCT/US2004/009668

(22) International Filing Date: 29 March 2004 (29.03.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/458,241 28 March 2003 (28.03.2003) US

(71) Applicant (for all designated States except US):  
**THOMAS JEFFERSON UNIVERSITY** [US/US];  
1020 Walnut Street, Philadelphia, PA 19107 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SAN ANTONIO, James, D.** [US/US]; 641 Farnum Road, Media, PA 19063 (US). **SCHICK, Barbara, P.** [US/US]; 221 Welsh Terrace, Merion Station, PA 19066 (US). **VERRECCHIO, Angela** [US/US]; 1732 Spruce Street, #3R, Philadelphia, PA 19103 (US).

(74) Agent: **MONACO, Daniel, A.**; Drinker Biddle & Reath LLP, One Logan Square, 18th and Cherry Street, Philadelphia, PA 19103-6996 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
18 August 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **HEPARIN-BINDING PEPTIDES AND USES THEREOF**

(57) Abstract: Heparin-binding peptides are provided of the formula  $R_1(X_1B_1B_2B_3X_2X_3Y_1R_2)_nR_3$ ,  $R_1(X_1B_1B_2B_3X_2X_3B_4X_4Y_1R_2)_nR_3$ , and  $C(X_1B_1B_2B_3X_2X_3B_4X_4)_nC$ ; wherein  $X_1$ ,  $X_2$ ,  $X_3$ , and  $X_4$  are independently selected from the group consisting of hydrophobic amino acids;  $B_1$ ,  $B_2$ ,  $B_3$ , and  $B_4$  are independently selected from the group consisting of basic amino acids; C is cysteine;  $Y_1$  is zero or one to ten amino acid residues, wherein at least one amino acid residue is proline; n is an integer from one to ten; and  $R_1$ ,  $R_2$ , and  $R_3$  are independently selected segments containing from zero to twenty amino acid residues, provided, at least one of the segments  $R_1$ ,  $R_2$ , and  $R_3$  comprises at least one hydrophobic amino acid residue. The peptide  $C(X_1B_1B_2B_3X_2X_3B_4X_4)_nC$  is optionally cyclized via a disulfide bond formed between cysteine residues. The peptides are administered to reduce plasma LMWH and heparin levels and to reduce the anticoagulant effects of heparin and LMWH. The peptides are also administered to inhibit microbial growth and to inhibit mast cell serine proteases involved in various diseases and disorders. The peptides are also administered as carriers to deliver active agents.

WO 2005/014619 A3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/09668

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61K 38/00

US CL : 514/8

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 514/8

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,877,153 (HARRIS et al.) 02 March 1999 (03.03.1999), entire document, especially title/abstract, claims 18-20.	1-65
Y	US 2003/0069170 A1 (SOLTERO et al.) 10 April 2003 (10.04.2003), entire document, especially para 73, 119, 120, 122, 123,.	1-65

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

31 May 2005 (31.05.2005)

Date of mailing of the international search report

22 JUN 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Maury Audet

Telephone No. 571-272-0960

# INTERNATIONAL SEARCH REPORT

PCT/US04/09668

## Continuation of B. FIELDS SEARCHED Item 3:

EAST (USPTO Internal). Note: Sequence Listing was unsearchable (Errors) and only a general search of the invention could therefore be undertaken.